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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,167	04/06/2004	Yanhai Du	UCT-0042	7021
23413	7590	03/23/2007		
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			EXAMINER HODGE, ROBERT W	
			ART UNIT	PAPER NUMBER
			1745	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/23/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/820,167

Applicant(s)

DU ET AL.

Examiner

Robert Hodge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*: See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 9/3/04 & 10/14/04.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The Information Disclosure Statements filed 9/3/04 and 10/14/04 have been considered by the Examiner and have been placed in the applications file.

### ***Specification***

The disclosure is objected to because of the following informalities: Applicants claim to priority is improper. Applicants claim to priority should be to U.S. Provisional Application Serial No. 60/461,850, filed April 10, 2003, not what is listed in the specification.

Appropriate correction is required.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the embodiments of electrochemical cells not equidistantly spaced and electrochemical cells eccentrically arranged must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

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number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "not equidistantly spaced" in claim 10 is a relative term which renders the claim indefinite. The term "not equidistantly spaced" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the

invention. Therefore the error alone of manufacturing the fuel cell parts reads on said recitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 9-16, 18, 20 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by JP-01298647 hereinafter Matsuo.

Through an oral translation Matsuo teaches a cylindrical (i.e. having a circular cross-section) solid oxide fuel cell stack, wherein the cells are tubular and are disposed concentrically one within another and are parallel to one another, wherein they are arranged such that the anodes and cathodes are circumferentially opposed to each other, the stack comprises spacers made of a perovskite structure using materials such as NiCr, NiAl, FeNiCo and LaCrO, the anode comprises Ni oxide or Co oxide, the electrolyte comprises Yittria Stabilized Zirconia, said tubular stacks are supported by a base plate having grooves to support the tubular stacks such that a longitudinal axis of the stack is perpendicular to the surface of the base plate as well as arranging the stacks eccentrically with respect to the other stacks, wherein the spacing of the cells is substantially equidistant from the neighboring cell, the cells within the stacks are connected in series with a resistive load, with oxygen flowing through the cathode side

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and hydrogen flowing through the anode side, and said tubes may be used as supporting structures for the individual cells (whole document). As discussed above certain error is present during the manufacturing of the fuel cell parts that would make them substantially imperfect and therefore the cells could potentially not be perfectly equidistantly spaced from one another due to the imperfections present in the fuel cell parts, therefore Mastuo reads on claim 10 as recited.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mastuo in view of U.S. Patent No. 3,337,203 hereinafter Rohland.

Mastuo as discussed above is incorporated herein.

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Mastuo does not teach what material is used in the construction of the base plate.

Rohland teaches tubular solid oxide fuel cells wherein the base plate comprises a ceramic material (column 5, lines 12-14).

At the time of the invention it would have been obvious to one having ordinary skill in the art to use a ceramic material for the base plate in Mastuo as taught by Rohland in order to provide a base plate that will be able to tolerate the high temperatures of the solid oxide fuel cell stack during operation in order to prevent the base plate from melting or cracking during operation.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mastuo.

Mastuo as discussed above is incorporated herein.

Although not explicitly discussed by Mastuo a person having ordinary skill in the art at the time the invention was made would realize that certain error is present during the manufacturing of the fuel cell parts that would make them substantially imperfect and therefore the cells would not be perfectly equidistantly spaced from one another due to the imperfections present in the fuel cell parts. It has also been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuo in view of U.S. Patent No. 5,330,859 hereinafter McPheeters.

Mastuo as discussed above is incorporated herein.

Mastuo does not teach the specific distance between the successive cells, but does teach that the cells are very thin.

McPheeters teaches that in fuel cell construction it is important to minimize the distance between the unit cells (column 3, lines 58-66).

At the time of the invention it would have been obvious to one having ordinary skill in the art to minimize the distance between the unit cells of Mastuo as taught by McPheeters in order to minimize the electrical resistance between the cells. It has also been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuo in view of U.S. Patent No. 5,599,639 hereinafter Sansone.

Mastuo as discussed above is incorporated herein.

Mastuo does not teach disposing the catalyst for the anode and cathode respectively on carbon paper or carbon black.

Sansone teaches a fuel cell wherein platinum is disposed on carbon paper for the anode and carbon black for the cathode (column 7, line 58 – column 8, line 32).

At the time of the invention it would have would have been obvious to one having ordinary skill in the art to include the anode and cathode catalyst layers on carbon paper and carbon black respectively in Mastuo as taught by Sansone in order to provide a structural support for the sensitive catalyst that is also conductive to increase the overall conductive properties of the fuel cell stack.



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Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mastuo in view of U.S Patent No. 4,749,632 hereinafter Flandermeyer.

Mastuo as discussed above is incorporated herein.

Mastuo does not teach the specific ceramic materials for the cathode as recited in claim 21.

Flandermeyer teaches solid oxide fuel cells that comprise cathodes formed of lanthanum manganite doped with strontium and lanthanum manganite (column 3, lines 54 – column 4, line 12).

At the time the invention was made it would have been obvious to one having ordinary skill in the art to include lanthanum manganite doped with strontium or lanthanum manganite as the ceramic material for the cathode in Mastuo as taught by Mastuo in order to enhance the oxygen surface exchange of the cathode thus increasing the overall efficiency of the fuel cell and the chemical reactions on the cathode surfaces.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuo in view of U.S. Patent No. 4,749,553 hereinafter Lopez.

Mastuo as discussed above is incorporated herein.

Mastuo does not teach a sensor comprising a fuel cell.

Lopez teaches a sensor that measures alcohol present in a gas stream by using an electrochemical fuel cell (abstract).

At the time of the invention it would have been obvious to one having ordinary skill in the art that the fuel cell of Mastuo can be used in a sensing device such as that

taught by Lopez, in order to provide a sensor that detects the output voltage of the fuel cell responsive to the amount of fuel provided to said fuel cell.

Claims 12 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mastuo in view of EP 0875285 hereinafter Gottzmann.

Mastuo as discussed above is incorporated herein.

Mastuo does not teach an oxygen pump comprising a fuel cell.

Gottzmann teaches an oxygen pump comprising a solid oxide fuel cell stack, wherein the fuel cells are tubular and are eccentrically arranged within the housing (page 5, line 14 – page 8, line 51 and figure 1).

At the time of the invention it would have been obvious to one having ordinary skill in the art to include the fuel cell of Mastuo in an oxygen pump as taught by Gottzmann in order to provide an oxygen pump that is compact and would efficiently extract oxygen from a feed gas stream.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Hodge whose telephone number is (571) 272-2097. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RWH

  
**JONATHAN CREPEAU**  
**PRIMARY EXAMINER**